Chapter

Introductory Chapter: *Mentha piperita* (a Valuable Herb): Brief Overview

Rabia Shabir Ahmad, Ali Imran, Muhammad Sajid Arshad, Muhammad Bilal Hussain, Marwa Waheed, Saira Safdar and Zarina Yasmin

1. Introduction

In different parts of the world, herbs were utilized for medicines, food, and many other purposes. In various countries, research is being done to discover the potential applications of medicinal plants in favor of human beings [1]. *Mentha* was described and named by Jussieu in 1789. It is a member of the Lamiaceae family, and their plants generally contain flowers with prominent liplike lower petals. Small trees, perennial or annual herbs, and shrubs are members of this family. The genus *Mentha* has been in a state of flux with especial reference to its taxonomy, as more than 3000 names have been being published since 1753. Keeping in view the chromosome numbers, phylogenetic analysis, and major essential oil components, *Mentha* has been redefined to comprise of 18 species and 11 hybrids, which are divided into four sections [2]. These species are herbaceous and perennial plants, commonly cultivated for flavor and a pleasant aroma. Natural menthol has a soothing and relaxing cooling impact on the mucous membrane of the human body and on the skin. Oil extracted from *Mentha* has cosmetic, pharmaceutical, and perfumery applications. Sometimes, it is also used for culinary purposes for food and flavors [3].

2. Classification

Kingdom: Plantae plants
Phylum: Magnoliophyta
Class: Magnoliopsida
Order: Lamiales
Family: Lamiaceae
Genus: *Mentha*
Species: Piperita [4]

3. Cultivation

Mints have the potential to grow nears water pools, rivers, lakes, and partially moist cool spots. They also can grow under the sun. These can grow throughout the year [5]. For its cultivation, Mediterranean Basin is a primary resource, but tropical and temperate regions are mostly noted as the best resource. *Mentha* is not

cultivated in South America and Antarctica. But in all other countries, it is widely distributed. Australia, Europe, Central Asia, and North Africa are the main centers of the genus *Mentha* cultivation [6].

4. Description

Mints are the aromatic and perennial herbs, having overground and underground stolons, which are quite widespread. They also have square, erect, and branched stems. The arrangement of their leaves is in opposite pairs, from oblong to lanceolate with the downy approach and sharp edges. The color profile of *Mentha* leaves is quite broad ranging from blue, dark green, grayish green to purple, and it could be pale yellow. *Mentha* flowers are being produced in false whorls also known as verticillasters, and their color range is from white to purple. A flower having two-lipped corolla portion with four lobes and its fruit has 1–4 seeds, covered with a stony layer [2].

5. Species

The following is a list of some major species of Mentha used for medicinal purpose (**Table 1**).

5.1 *Mentha arvensis*

Mentha arvensis is an aromatic branched herb that can reach a height of 40 cm, with terminal branches in ascending position. Leaves are 1.5–2 cm in length, round-tipped with tooted margins having the shape of oblong-ovate. The flowers produced

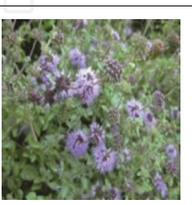
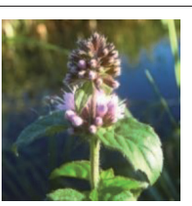
S.N.	Species name	Function	Picture	Reference
1	*Mentha arvensis* L.	The plant is used to treat liver and spleen diseases, asthma, and jaundice		[7]
2	*Mentha longif olia* (L.) L.—horsemint	Longifolia L. is used as a medicinal plant with properties including antispasmodic, antimicrobial, anti-bloating, anti-coughing, and antiasthmatic		[8]
3	*Mentha puleg ium* L.—pennyroyal	Pennyroyal is frequently used as an insecticide and pest repellent		[9]
4	*Mentha aquatica*	Mint was originally used as a medicinal herb to treat stomachache and chest pains, and it is commonly used in the form of tea as a home remedy to stimulate digestion		[10]

Table 1.
Major species of Mentha *plant used for medical purpose.*

on this plant are purplish to light blue in color, having hairs on them. It is used to cure the maladies of asthma, liver, jaundice, and spleen. Oil is procured from the distillation of leaves having 40–50% of menthol. Its oil is carminative, stimulant, antiseptic, and diuretic. Menthol is being used in drugs for the cure of stomach issues and in ointments for the remedy of headache. Its leaves are also deployed as a remedy for rheumatic pains and indigestion. Its active constituents comprise of menthone, menthol, limonene, methyl acetate, isomenthone, beta-caryophyllene, tannins, neomenthol, alpha- and beta-pinene, flavonoids, and piperitone. Its oil consists of 4.5–10% esters, menthyl acetate along with ketones with a percentage of 15–20% [11].

Mentha arvensis produces 70–90% of menthol along with cineol piperitone, sesquiterpene, and cineol piperitone as the other ingredients. The plant of mint contains chrysoeriol, eriocitrin, isorhoifolin, hesperidoside, methyl rosmarinate, linarin, narirutin, acacetin, tilicine, hesperidin, rutin, menthoside, luteolin, nodifloretin, and flavonoids diosmin. It also consists of the phenolic acids including lithospermic acid, protocatechuic acid, rosmarinic acid, daucosterol, β-sitosterol, anthraquinones aloe-emodin, phytosterols, chrysophanol, protocatechuic aldehyde, tannins, emodin, and caffeic acid [12] (**Figure 1**).

5.2 *Mentha longifolia* (L.) L.—horsemint

Mentha longifolia also called the horsemint; it is a native plant of Europe but not of Ireland and Britain. It is also present in the central and western Asia and in the northern and southern Africa. It is a herbaceous perennial plant having an aroma of peppermint. It includes rhizome having a creeping nature, which can grow up to a height of 40–120 cm. Its leaves are 5–10 cm long, 1.5–3.0 cm in width having above the color of green to grayish green with white color on the below side of leaves. Its flowers are of purple or white color, having a length of 3–5 cm in length, and are produced in thick clusters on branched and tall spikes. They produce flowers from mid to late summer, which form clonal colonies. They help in the cure of bad breath and protection of teeth. They also help in the removal of dandruff when used in combination with vinegar [13] (**Figure 2**).

Figure 1.
Mentha arvensis *[7].*

Figure 2.
Mentha longifolia *[13]*.

5.3 *Mentha pulegium* L.—pennyroyal

Mentha pulegium, commonly (European) pennyroyal, or pennyrile, also called squaw mint, mosquito plant, and pudding grass, is a species of flowering plant in the mint family, Lamiaceae, which is native to Europe, North Africa, and the Middle East. Crushed pennyroyal leaves give a very strong scent similar to spearmint [14]. Pennyroyal is a traditional folk remedy abortifacient and culinary herb, but it is toxic to the liver and has caused some deaths. European pennyroyal relates to an American species, *Hedeoma pulegioides*. Though they differ in genera, they share similar chemical properties. Pennyroyal is frequently used as an insecticide and pest repellent. As a pest repellent, it is used to keep fleas away from the household animals as well as humans to ward off gnats and mosquitos. Some flea collars for pets have pennyroyal oil, or the herb can be crushed in the lining. Humans have also put crushed pennyroyal stems in their pockets or on their clothing to ward off unwanted insects [15] (**Figure 3**).

5.4 *Mentha aquatic*

Mentha aquatic is a flowering plant which also belongs to the family Lamiaceae. It can grow in wet and moist areas and is native to northwest Africa, southwest Asia, and most parts of Europe. It has also been introduced to South America, North America, few Atlantic islands, and Australia. It can grow along the channels and margins of rivers, dikes, streams, wet meadows, pools, marshes, ditches, canals, and

Figure 3.
Mentha pulegium *[13]*.

DOI: http://dx.doi.org/10.5772/intechopen.93627

Figure 4.
Mentha aquatica *[11].*

fens. The suitable soil for its growth is slightly acidic to mineral soil. It is a rhizomatous and herbaceous perennial plant that can grow up to 35 inches tall. Its stems are less hairy to almost hairy, having purple or green in color square area. Its rhizomes are fleshy, wide-spreading, and having fibrous roots. Its leaves are 1–4 cm in width, 2–6 cm in length, with hairs on the surface. The flowers of the water mint plant are densely crowded, tiny in size, and tubular, with the flowering season ranging from mid to late summer [11] (**Figure 4**).

6. *Mentha* uses

Fresh mint leaves have been utilized for the chewing purpose. It is also used as mouthwashes to treat bleeding gums [16]. Crushed mint leaves were utilized for the brightness of teeth during ancient times. It is also utilized in making oral dentifrices to clean and polish natural teeth. However, peppermint is beneficial for the gums of babies as it reduces the pain and gives germ-free teeth. *Mentha* plant comprises essential oil whose major constituent is menthol, which is used for oral hygiene products, pharmaceuticals, cosmetics, and foods [17]. There are four major varieties of mint cultivated commonly such as spearmint, corn mint, scotch spearmint, and peppermint. Mint was initially utilized as a medicinal herb to cure body pains and stomachache, and its tea is good for the gastrointestinal tract, digestion, and dyspepsia and is used to treat biliary disorders [18].

6.1 Conventional medicine and cosmetics

Menthol from mint is a source of essential oil which accounts for 40–90%, and it is being utilized in cosmetics and many fragrances [19]. Menthol and mint essential oil are used in aromatherapy, which might become helpful to decrease the effect of post-surgery nausea [20].

6.2 Allergic effect

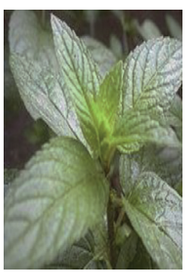
It is utilized in various customer products. In several people, mint can give allergic reactions including heartburn, stinging, diarrhea, headache, abdominal cramps, and anaphylaxis [21].

6.3 Room fragrance and aromatherapy

In ancient times, peppermint was known as the herb of kindness and warmth, and it was the first herb used in Europe as a room deodorizer. To diminish the smell of soil, the floor was covered with a sprinkled herb which spread its sweet scent throughout the room. Nowadays, because of the essential oil, peppermint is used for aromatherapy [22].

7. Unfavorable and toxic effect

There are several adverse side effects regarding peppermint. Peppermint and its major chemical components like menthone, menthol, pulegone, and menthofuran are proved to be toxic with a moderate effect on some individuals. Its essential oil combines with the cytochrome P450 isoenzyme in the liver microsomes of humans. The use of peppermint is restricted or must be used with caution in patients having inflammation in gall bladder and blockage of bile duct [23] (**Table 2**).

S. N.	Species Name	Function	Picture	Reference
1	*Mentha suaveolens*	*Mentha suaveolens* is used for medicinal purposes for thousands of years in many parts of the world, including Africa, Europe, Asia, and the Americas		[24]
2	Peppermint	A common side effect of the oral intake of peppermint oil or capsules is heartburn. Oral use of peppermint products may have adverse effects when used with iron supplements, cyclosporine, medicines for heart conditions or high blood pressure, or medicines to decrease stomach acid		[10]
3	*Mentha requienii*	In traditional medicine, this plant has been used as an antiseptic, a carminative, and a febrifuge The smell of mint is disliked by rats and mice, and this plant has been used for strewing on the floor to deter rodents		[25]
4	Spearmint	It is used as a flavoring for toothpaste and confectionery and is sometimes added to shampoos and soaps		[26]
5	*Mentha canadensis*	It is grown in Hungary for essential oil and menthol production		[27]

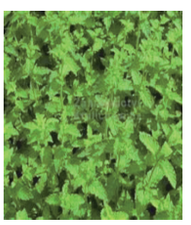
S. N.	Species Name	Function	Picture	Reference
6	*Mentha australis*	It is used as bush food, an insect repellent, and is also said to have medicinal properties. *Mentha australis* is commonly called River Mint		[28]
7	*Menthe gracilis*	It is used as the traditional flavoring of Scotch mint candies. In Vietnamese cuisine, the fresh herb is used as a flavoring in chicken or beef. As a medicinal herb, it is used to treat fevers, headaches, and digestive ailments		[29]
8	*Mentha dahurica*	It is used as a culinary herb and medicinal herb. It is used as a groundcover		[30]
9	*Mentha diemenica*	The plant was therefore used in homes as a strewing herb and has also been spread in granaries to keep the rodents off the grain		[31]

Table 2.
Other well-known species of Mentha *plant used for medical purpose.*

Acknowledgements

The authors are highly obliged to the Library Department, Government College University Faisalabad, Pakistan and IT department, Higher Education Commission (HEC, Islamabad) for access to journals, books and valuable database.

Conflict of interest

The authors declare no conflict of interest.

Author details

Rabia Shabir Ahmad[1*], Ali Imran[2], Muhammad Sajid Arshad[1], Muhammad Bilal Hussain[2], Marwa Waheed[2], Saira Safdar[1] and Zarina Yasmin[3]

1 Department of Food Science, Nutrition and Home Economics, Faculty of Life Sciences, Government College University, Faisalabad, Pakistan

2 Institute of Home and Food Sciences, Faculty of Life Sciences, Government College University, Faisalabad, Pakistan

3 Post Harvest Research Centre, Ayub Agriculture Research Institute, Faisalabad, Pakistan

*Address all correspondence to: rabiaahmad@gcuf.edu.pk

References

[1] Heinrichs PA, Nikolaus CJ, Ellison B, Nickols-Richardson SM, Chapman-Novakofski K. Vegetables, herbs and spices: The importance of family and tasting. Health. 2016;**8**(14):1554

[2] Lawrence BM. Mint: The Genus *Mentha*. Boca Raton, FL, USA: CRC Press; 2006

[3] Ansari MA, Vasudevan P, Tandon M, Razdan RK. Larvicidal and mosquito repellent action of peppermint (*Mentha piperita*) oil. Bioresource Technology. 2000;**71**(3):267-271

[4] Kanakis CD, Petrakis EA, Kimbaris AC, Pappas C, Tarantilis PA, Polissiou MG. Classification of Greek *Mentha pulegium* L. (pennyroyal) samples, according to geographical location by Fourier transform infrared spectroscopy. Phytochemical Analysis. 2012 Jan;**23**(1):34-43

[5] Taneja SC, Chandra S. Mint. In: Handbook of Herbs and Spices. Sawston, UK: Woodhead Publishing; 2012. pp. 366-387

[6] Salehi B, Stojanović-Radić Z, Matejić J, Sharopov F, Antolak H, Kręgiel D, et al. Plants of genus *Mentha*: From farm to food factory. Plants. 2018; **7**(3):70

[7] Akram M, Uzair M, Malik NS, Mahmood A, Sarwer N, Madni A, et al. *Mentha arvensis* Linn.: A review article. Journal of Medicinal Plant Research. 2011;**5**(18):4499-4503

[8] Mikaili P, Mojaverrostami S, Moloudizargari M, Aghajanshakeri S. Pharmacological and therapeutic effects of *Mentha longifolia* L. and its main constituent, menthol. Ancient Science of Life. 2013;**33**(2):131

[9] Aziz EE, Rezk AI, Omer EA, Nofal OA, Salama ZA, Fouad H, et al. Chemical composition of *Mentha pulegium* L. (pennyroyal) plant as influenced by foliar application of different sources of zinc. Egyptian Pharmaceutical Journal. 2019;**18**(1):53

[10] McKay DL, Blumberg JB. A review of the bioactivity and potential health benefits of peppermint tea (*Mentha piperita* L.). Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives. 2006;**20**(8):619-633

[11] Anwar F, Abbas A, Mehmood T, Gilani AH, Rehman NU. *Mentha*: A genus rich in vital nutra-pharmaceuticals—A review. Phytotherapy Research. 2019;**33**(10): 2548-2570

[12] Thawkar BS. Phytochemical and pharmacological review of *Mentha arvensis*. International Journal of Green Pharmacy (IJGP). 2016;**10**(2):71-72

[13] Farzaei MH, Bahramsoltani R, Ghobadi A, Farzaei F, Najafi F. Pharmacological activity of *Mentha longifolia* and its phytoconstituents. Journal of Traditional Chinese Medicine. 2017;**37**(5):710-720

[14] Goodarzi M, Nanekarani S. Effects of feeding *Mentha pulegium* L. as an alternative to antibiotics on performance of broilers. APCBEE Procedia. 2014;**8**:53-58

[15] Motamedi H, Seyyednejad M, Dehghani F, Hasannejad Z. Investigation of antibacterial activity of ethanolic and methanolic extracts of *Mentha pulegium* L. Zahedan Journal of Research in Medical Sciences. 2014; **16**(10):55-59

[16] Ashu Agbor M, Naidoo S. Ethnomedicinal plants used by traditional healers to treat oral health

problems in Cameroon. Evidence-Based Complementary and Alternative Medicine. 2015;**1**:2015

[17] Singh P, Pandey AK. Prospective of essential oils of the genus Mentha as biopesticides: A review. Frontiers in Plant Science. 2018;**9**:1295

[18] Fifi AC, Axelrod CH, Chakraborty P, Saps M. Herbs and spices in the treatment of functional gastrointestinal disorders: A review of clinical trials. Nutrients. 2018;**10**(11): 1715

[19] Carvalho IT, Estevinho BN, Santos L. Application of microencapsulated essential oils in cosmetic and personal healthcare products—A review. International Journal of Cosmetic Science. 2016;**38**(2): 109-119

[20] Hines S, Steels E, Chang A, Gibbons K. Aromatherapy for treatment of postoperative nausea and vomiting. Cochrane Database of Systematic Reviews. 2018;**3**:1-78

[21] Rodriguez-Fragoso L, Reyes-Esparza J, Burchiel SW, Herrera-Ruiz D, Torres E. Risks and benefits of commonly used herbal medicines in Mexico. Toxicology and Applied Pharmacology. 2008;**227**(1):125-135

[22] Sowndhararajan K, Kim S. Influence of fragrances on human psychophysiological activity: With special reference to human electroencephalographic response. Scientia Pharmaceutica. 2016;**84**(4): 724-751

[23] Malekmohammad K, Rafieian-Kopaei M, Sardari S, Sewell RD. Toxicological effects of Mentha x piperita (peppermint): A review. Toxin Reviews. 2019;**1**:1-5

[24] Božović M, Pirolli A, Ragno R. *Mentha suaveolens* Ehrh.(Lamiaceae) essential oil and its main constituent piperitenone oxide: Biological activities and chemistry. Molecules. 2015 May;**20** (5):8605-8633

[25] Chessa M, Sias A, Piana A, Mangano GS, Petretto GL, Masia MD, et al. Chemical composition and antibacterial activity of the essential oil from *Mentha requienii* Bentham. Natural Product Research. 2013;**27**(2):93-99

[26] Bimakr M, Rahman RA, Taip FS, Ganjloo A, Salleh LM, Selamat J, et al. Comparison of different extraction methods for the extraction of major bioactive flavonoid compounds from spearmint (*Mentha spicata* L.) leaves. Food and Bioproducts Processing. 2011; **89**(1):67-72

[27] Tucker AO, Chambers HL. *Mentha canadensis* L.(Lamiaceae): A relict amphidiploid from the lower tertiary. Taxon. 2002;**51**(4):703-718

[28] Tang KS, Konczak I, Zhao J. Identification and quantification of phenolics in Australian native mint (*Mentha australis* R. Br.). Food Chemistry. 2016;**192**:698-705

[29] Paulus D, Becker D, Nava GA, Luckmann D, de Andrade Moura C. Cultivation of mint (Mentha x gracilis) in intercropping with fruit trees in an agroforestry system: Production and quality of essential oil. European Journal of Medicinal Plants. 2019;**9**:1-9

[30] Zhang Y, Wang X, Miao T, Wang C. Research on the diversity of *Mentha dahurica* Fisch. Ex Benth. Of the Xiaoxing'an mountains area in Heilongjiang province. In: IOP Conference Series: Earth and Environmental Science. Vol. 358, No. 2. IOP Publishing; 2019. pp. 1-4

[31] Abbaszadeh B, Valadabadi SA, Farahani HA, Darvishi HH. Studying of essential oil variations in leaves of *Mentha* species. African Journal of Plant Science. 2009;**3**(10):217-221